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Shrimps and Shrimp-like Anomurans (Crustacea, Decapoda) from Southeastern Alaska and Prince William Sound

H. J. Squires and Armando J. G. Figueira

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Biographical Note

Hubert J. Squires graduated from McGill University with a B.Sc. in 1950 and an M.Sc. in 1956. In 1963 he obtained a Ph.D. in marine biology from the University of Durham (Newcastle upon Tyne).

Dr. Squires was employed with the Fisheries Research Board of Canada from 1946 to 1968, working primarily on shrimps, squids and lobsters. In 1968 he joined the Food and Agriculture Organization of the United Nations as a shrimp biologist with the Maritime Fisheries Development Project in Colombia, and was director of the project from 1968 to 1972. He is now employed by the Canadian International Development Agency as director of fisheries in Fiji. His main interests include shrimp fisheries, shrimp systematics, and the spawning potential of decapod Crustacea. His published work has been primarily on squids, oysters, shrimps, and lobsters.

Summary

This paper deals with the caridean and thalassinidean decapods obtained by the National Museum of Canada Marine Biological Expedition in 1961 to the coastal waters of southeastern Alaska and Prince William Sound. A total of 40 species (21 hippolytids, eight pandalids, 10 crangonids and one callianassid) were collected. Five of the hippolytids exhibit new range extensions. Some remarks on the biology and the ecology of several of the species are included.

Résumé

Les crustacés décapodes (crevettes et thalassinidés) qui font l'objet du présent travail ont été recueillis en 1961 dans les eaux côtières du sud-est de l'Alaska et du détroit du Prince William par une mission de biologie marine du Musée national du Canada. La collection comprend 40 espèces (21 hippolytidés, huit pandalidés, 10 crangonidés et un callianassidé); l'examen des spécimens a permis d'élargir la répartition zoogéographique de cinq des hippolytidés. L'ouvrage porte aussi sur la biologie et sur l'écologie de plusieurs des espèces.

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The authors wish to thank Dr. E. L. Bousfield, National Museum of Natural Sciences, Ottawa, for the provision of field notes and specimens used in the preparation of this paper; Dr. L. B. Holthuis, Rijksmuseum van Natuurlijke Historie, Leiden, Holland, for reviewing the final draft; Dr. R. B. Manning, National Museum of Natural History, Smithsonian Institution, Washington, D.C., for the loan of specimens of *Crangon septemspinosa* from Alaska and Chesapeake Bay; Mr. L. Riche, Resource Development Branch, Department of Fisheries, St. John's, Newfoundland, for specimens of *Crangon septemspinosa* from White Bear Bay, Newfoundland; Mr. G. E. Tucker, Biological Station, St. John's, Newfoundland, for measuring some of the specimens and examining the state of maturation of their gonads.

Preface

The Marine Biological Expedition of the National Museum of Canada to southeastern Alaska and Prince William Sound in 1961 was concerned primarily with the collection of fishes and amphipod crustaceans. In addition, a fairly extensive series of decapod crustaceans, mostly from the intertidal zone, but also from depths as great as 66 fathoms, were obtained. An account of the brachyurans and crab-like anomurans has been published by Hart (1968). The present study treats carideans and thalassinideans.

The station data of this expedition are given by Bousfield and McAllister (1962); the field-station numbers are utilized herein. The length of the carapace (abbreviated in this paper as c.l.), measured dorsally from the hind margin of the orbits in the carideans and from the distal end of the rostrum in the specimens of *Upogebia,* is used as the standard measurement in this study; the sex of the carideans was determined by examination of the gonads or the endopod of the first and second pleopods, and the sex of the specimens of *Upogebia* was determined by the presence or absence of the first pair of pleopods. The state of maturation of the ovaries and the size of the ova were also examined in a number of specimens of several species.

The synonymies given in this paper are restricted to Rathbun's 1904 monograph, which, despite its shortcomings, is still the fundamental work for the study of the decapods of the region under consideration, and to one or two fundamental publications on each family.

H. J. Squires wrote a preliminary draft on the major part of the collection, prepared the drawings for *Crangon alaskensis* and *C. septemspinosa,* examined the gonads, and measured the eggs; Armando J. G. Figueira completed the identification of part of the collection and prepared the final draft.

All specimens are deposited at the National Museum of Natural Sciences, National Museums of Canada, Ottawa.

Suborder Natantia

Family Hippolytidae

***Eualus avinus* (Rathbun 1899)**
Eualus avinus: Holthuis 1947, p. 10.
Spirontocaris avina: Rathbun 1904, p. 103, fig. 47.

Description
One female (with a few eyed eggs adhering to the pleopods), c.l. 6.9 mm; Sta. A-143. Tip of right antennal scale and tip of telson broken off, pereiopods lacking.

Remarks
This is apparently the northernmost record of *E. avinus* for the Gulf of Alaska.

***Eualus fabricii* (Krøyer 1841)**
Eualus fabricii: Holthuis 1947, p. 10.
Spirontocaris fabricii: Rathbun 1904, p. 85.

Description
One female, c.l. 6.0 mm; Sta. A-100.
One female, c.l. 5.7 mm; Sta. A-119.

Remarks
The female from Sta. A-100 contained small ova.

***Eualus gaimardii* (H. Milne-Edwards 1837)**
Eualus gaimardii: Holthuis 1947, p. 10.

Description
One male, c.l. 4.0 mm; Sta. A-45.

***Eualus pusiolus* (Krøyer 1841)**
Eualus pusiolus: Holthuis 1947, p. 11.
Spirontocaris pusiola: Rathbun 1904, p. 99.

Description
One female, c.l. 3.0 mm; Sta. A-45.
One male, c.l. 3.0 mm; Sta. A-81.

Remarks
The female contained small ova.

(?) *Eualus suckleyi* (Stimpson 1864)

Description
One female, c.l. 8.2 mm; Sta. A-84. Tip of rostrum broken off, otherwise in good condition. Parasitic isopod on ventral side of abdomen.

Three males, c.l. 6.5–11.1 mm, 11 females, c.l. 7.8–14.6 mm; Sta. A-119. Four of the specimens in poor condition. Parasitic isopod under the right side of carapace of two of the females (c.l. 7.8 and 10.2 mm).
Two males, c.l. 8.0 and 9.7 mm; Sta. A-143.

Remarks
The rostrum of these specimens extends well beyond the tip of the antennal scale; rudimentary epipods are present on the second pereiopods of almost all specimens; and the dactylus of the fifth pereiopods attain, or even extend beyond, the tip of the antennal scale.

***Eualus townsendi* (Rathbun 1902)**
Eualus townsendi: Holthuis 1947, p. 11.
Spirontocaris townsendi: Rathbun 1904, p. 87, fig. 37.

Description
One male, c.l. 4.2 mm; Sta. A-144. Tip of rostrum and antennal flagella are broken off.

Remarks
The present specimen is tentatively referred to *E. townsendi.* The rostrum and the antennal scale, however, are appreciably longer than the carapace, and the fifth pereiopods extend beyond the third maxillipeds by about the length of the dactylus.

***Heptacarpus brevirostris* (Dana 1852)**
Heptacarpus brevirostris: Holthuis 1947, p. 12.
Spirontocaris brevirostris: Rathbun 1904, p. 99.

Description
Three hundred fifty-eight specimens, males (c.l. 2.0–11.0 mm), females (c.l. 2.5–10.0 mm), juveniles (c.l. 1.5–3.0 mm), post-larvae (c.l. 1.0–2.5 mm), and larvae (c.l. 1.0–1.5 mm); Sta. A-3, A-13, A-18, A-22, A-23, A-32, A-48, A-54, A-67, A-71, A-75, A-80, A-83, A-84, A-87, A-91, A-92, A-93, A-115, A-129, A-131, A-136, A-139, A-147, A-151, A-153, A-164, A-168, A-174, and A-175; nine other young specimens (mostly in quite poor condition) from Sta. A-54, A-57, and A-75 are also tentatively referred to *H. brevirostris.*

Remarks
Sta. A-131 and A-151 yielded the greatest quantity of specimens, with 68 and 61 respectively. Some of the females bore eyed eggs, whose diameter was 0.5–0.6 mm (usually 0.6

mm); the diameter of the non-eyed eggs was 0.4–0.6 mm (usually 0.5 mm). The gonads were examined in 28 ovigerous and 28 non-ovigerous females. Of the ovigerous females, 16 had large ova and 12 had small ova; of the non-ovigerous females, four had large ova and 24 had small ova.

***Heptacarpus camtschaticus* (Stimpson 1860)**
Heptacarpus camtschaticus: Holthuis 1947, p. 12.
Spirontocaris camtschatica: Rathbun 1904, p. 94, fig. 42.

Description
Seventy-five specimens (14 males, c.l. 5.0–5.5 mm, 41 females, c.l. 2.5–8.0 mm, and 20 juveniles, c.l. 2.0–3.0 mm); Sta. A-32, A-86, A-87, A-92, A-100, and A-174.

Remarks
Only one of the females (c.l. 8.0 mm) was ovigerous, the diameter of the eggs being 0.6 mm. None of the females contained large ova.

***Heptacarpus carinatus* Holmes 1900**
Heptacarpus carinatus: Holtuis 1947, p. 12.
Spirontocaris carinata: Rathbun 1904, p. 84.

Description
Four males, c.l. 4.4–6.0 mm, 21 females (3 ovigerous, one with eyed eggs), c.l. 5.0–10.0 mm; Sta. A-3, A-22, A-57, and A-175.

Remarks
Five of the specimens (from Sta. A-22) are tentatively identified. Two have the rostrum broken off, but the rostrum of the other three specimens bears three spines on the dorsal margin and only one or two on the ventral margin, excluding the one near the tip. The telson bears only two or three pairs of lateral spines. The antennal scale is appreciably shorter than the carapace, and the last three pairs of pereiopods are shorter than in typical *H. carinatus,* the merus of the third pereiopod possessing only one spine at the postero-inferior margin.

The diameter of the eyed eggs is 0.8 mm, and that of the non-eyed eggs is 0.6–0.7 mm. None of the females contained large ova.

These are apparently the northernmost records for *H. carinatus.*

***Heptacarpus decorus* (Rathbun 1902)**
Heptacarpus decorus: Holthuis 1947, p. 12.
Spirontocaris decora: Rathbun 1904, p. 79, fig. 33.

Description
One ovigerous female (with eyed eggs), c.l. 7.1 mm; Sta. A-144. Fourth right pereiopod broken off, otherwise in fair condition.

Remarks
The present specimen agrees with Rathbun's 1904 description and figure, except that the most distal spine on the dorsal border of the rostrum is situated just in front of the middle of the dorsal border.

This is apparently the northernmost record for *H. decorus.*

***Heptacarpus paludicola* Holmes 1900**
Heptacarpus paludicola: Holthuis 1947, p. 12.
Spirontocaris paludicola: Rathbun 1904, p. 101.

Description
One female, c.l. 3.6 mm; Sta. A-18. Third and fourth pereiopods of the left side broken off, otherwise in good condition. Parasitic isopod on anterior part of ventral side of abdomen.

Remarks
The present specimen agrees more or less with the descriptions of *H. paludicola* given by Holmes (1900) and Schmitt (1921). The rostrum is, however, a little longer than the carapace, and is apparently more slender than in the figure given by Holmes and reproduced by Schmitt. The antennal peduncle almost reaches the middle of the antennal scale; the second pereiopods extend beyond the end of the latter; and the telson (excluding the distal spines) is about as long as the antennal scale.

This is apparently the northernmost record for *H. paludicola.*

***Heptacarpus pictus* (Stimpson 1871)**
Heptacarpus pictus: Holthuis 1947, p. 13.
Spirontocaris picta: Rathbun 1904, p. 101.

Description
Ten females (8 ovigerous, of which 6 had eyed eggs), c.l. 3.5–5.0 mm; Sta. A-86.

Remarks
Seven of the ovigerous females contained large ova, and all the other females contained small ova. The diameter of the eyed eggs was 0.6 mm, and that of the non-eyed eggs was 0.5 mm.

This is apparently the northernmost record for *H. pictus*.

***Heptacarpus sitchensis* (Brandt 1851)**
Heptacarpus sitchensis: Holthuis 1947, p. 13.
Spirontocaris sitchensis: Rathbun 1904, p. 102.

Description
Ninety males, c.l. 1.5–3.2 mm, 153 females c.l. 2.5–5.5 mm; Sta. A-3, A-7, A-18, A-19, A-22, A-23, A-27, A-67, A-79, A-86, A-87, A-91, A-92, A-96, A-98, A-99, A-114, A-115, A-131, A-136, A-139, A-146, A-168, and A-174.

Remarks
Sta. A-86 and A-87 yielded the greatest quantity of specimens, 59 and 51 respectively. Eighty-four of the females were ovigerous, some bearing eyed eggs. One of the males, c.l. 3.2 mm, from Sta. A-27 (bearing a parasitic isopod on the ventral side of the abdomen) is tentatively referred to *H. sitchensis*. Although it possesses the thickened part of the outer antennular flagellum, extending beyond the tip of the antennal scale, it cannot be referred to *H. moseri* (the only other species of *Heptacarpus* recorded from Alaskan waters lacking an epipodite on the four posterior pairs of pereiopods) because of its shorter fifth pereiopods, which only attain the distal third of the antennal scale. In *H. moseri* the fifth pereiopods are stated to reach, or even extend beyond, the tip of the antennal scale.

The ovaries of 62 ovigerous and 62 non-ovigerous females were examined. Thirty-nine ovigerous and 10 non-ovigerous females had large ova, and all remaining females had small ova. The diameter of the eyed eggs was 0.5–0.6 mm (usually 0.6 mm), and that of the non-eyed eggs was 0.4–0.6 mm (usually 0.5 mm).

***Heptacarpus stimpsoni* Holthuis 1947**
Heptacarpus stimpsoni: Holthuis 1947, p. 13.
Spirontocaris cristata: Rathbun 1904, p. 102.

Description
Four males, c.l. 2.2–2.8 mm; Sta. A-86.

***Heptacarpus stylus* (Stimpson 1864)**
Heptacarpus stylus: Holthuis 1947, p. 13.
Spirontocaris stylus: Rathbun 1904, p. 84, fig. 36.

Description
Two females, c.l. ca. 7.5 and ca. 8.0 mm; Sta. A-3. Poor condition.
One female, c.l. 7.2 mm; Sta. A-19.
Forty-one juveniles, c.l. 3.0–4.0 mm; Sta. A-164 and A-168.

Remarks
These are apparently the northernmost records for *H. stylus*.

***Heptacarpus tridens* (Rathbun 1902)**
Heptacarpus tridens: Holthuis 1947, p. 13.
Spirontocaris tridens: Rathbun 1904, p. 81, fig. 34.

Description
One male, c.l. 6.1 mm; Sta. A-144. Poor condition.
Two females, c.l. 8.0–9.0 mm; Sta. A-173 and A-174.

Remarks
The two females had immature gonads.

***Heptacarpus* sp.**

Description
Six males, c.l. 1.9–2.4 mm; Sta. A-23. Three of the specimens in poor condition.
Two females, c.l. 2.5–2.6 mm; Sta. A-27.

Remarks
The specimens under consideration bear epipods on the third maxillipeds and first pair of pereiopods only; the thicker part of their antennular flagellum extends beyond the tip of the antennal scale; the third pereiopods extend beyond the tip of the antennal scale by approximately half to two-thirds of the propodus; the fourth pereiopods extend beyond the tip of the antennal scale by approximately one-third of the propodus; and the fifth pereiopods attain, or extend a little be-

yond, the tip of the antennal scale; the rostrum (which is as long as the carapace) is armed with six to seven teeth dorsally and two to three teeth ventrally, and the carapace bears no pterygostomian spine.

The present specimens, by having epipodites on the third maxillipeds and first pereiopods only, are very close to *Heptacarpus sitchensis* and *H. moseri;* they differ, however, from these two species by the absence of a pterygostomian spine. They also differ from *H. sitchensis* by having the third to fifth pereiopods much longer, and from *H. moseri* by the shape of the rostrum, which in the present specimens does not possess a broad lower limb, as described and illustrated by Rathbun (1904) for *H. moseri.*

***Spirontocaris phippsii* (Krøyer 1841)**
Spirontocaris phippsii: Rathbun 1904, p. 70; Holthuis 1947, p. 8.

Description
One male, 2 females, c.l. ca. 4.0 mm; Sta. A-45 and A-116.

***Spirontocaris ochotensis* (Brandt 1851)**
Spirontocaris ochotensis: Rathbun 1904, p. 71, fig. 26; Holthuis 1947, p. 8.

Description
One male, c.l. 4.0 mm, 4 females, c.l. 2.0–7.0 mm, 4 post-larvae, c.l. 1.5–2.0 mm; Sta. A-86, A-87, A-92, and A-151.

***Lebbeus groenlandicus* (Fabricius 1775)**
Lebbeus groenlandicus: Holthuis 1947, p. 9.
Spirontocaris groenlandicus: Rathbun 1904, p. 61.

Description
Two post-larvae, c.l. 2.0 mm; Sta. A-32.
One male, c.l. 7.0 mm, one female, c.l. 9.3 mm; Sta. A-119. Parasitic isopod on ventral side of abdomen of female.
Four males, c.l. 9.1–10.5 mm, 4 females c.l. 14.5–16.0 mm; Sta. A-144. Parasitic isopod on ventral side of abdomen of one of the females (c.l. 15.0 mm).

***Hippolyte clarki* Chace 1951**
Hippolyte clarki: Chace 1951, p. 37, fig. 1 (f–p).

Description
Six post-larvae, c.l. ca. 2.0 mm; Sta. A-32.
Four males, c.l. 2.0–2.5 mm, 42 females, c.l. 2.5–5.5 mm; Sta. A-3, A-8, A-32, A-87, A-174, and A-175.

Remarks
The ovaries of 21 ovigerous and 17 non-ovigerous females were examined. Three of the former and 10 of the latter had large ova, and the remaining females had small ova.

The diameter of the eyed eggs was 0.4–0.5 mm, and that of the non-eyed eggs was 0.3–0.5 mm (usually 0.4 mm).

Family Pandalidae

***Pandalopsis dispar* Rathbun 1902**
Pandalopsis dispar: Rathbun 1904, p. 54, pl. 1, fig. 2; de Man 1920, p. 105.

Description
Eight males, c.l. 21.0–24.0 mm, 6 transitionals, c.l. 24.1–29.1 mm, 2 females, c.l. 28.8 and 30.6 mm; Sta. A-13.
One male, c.l. 24.9 mm, 2 transitionals, c.l. 31.0 and 33.4 mm, 4 females, c.l. 33.9–37.0 mm; Sta. A-143.

***Pandalus borealis* Krøyer 1838**
Pandalus borealis: Rathbun 1904, p. 35; de Man 1920, p. 103.

Description
Two males, c.l. 10.2 and 11.5 mm, 2 transitionals, c.l. 16.2 and 17.5 mm, 2 females, c.l. 16.9 and 18.5 mm; Sta. A-13.
One female, c.l. 20.0 mm; Sta. A-40.
Two males, c.l. ca. 10.0 and ca. 12.0 mm; Sta. A-50.
Five juveniles, c.l. 2.6–3.3 mm; Sta. A-72.
Seven males, c.l. 15.0 and 17.0 mm, 20 transitionals, c.l. 16.0–21.1 mm, 35 females, c.l. 17.7–22.3 mm; Sta. A-76.
Four males, c.l. 11.1–14.8 mm, 29 transitionals, c.l. 17.0–20.5 mm, 14 females, c.l. 20.0–23.3 mm; Sta. A-84.
Six males, c.l. 11.0–16.0 mm, one transitional, c.l. 20.4 mm, 4 females, c.l. 20.5–26.6 mm; Sta. A-119.
One male, c.l. 16.1 mm, 2 transitionals, c.l. 19.4 and 20.8 mm, 7 females, c.l. 20.7–ca. 22.5 mm; Sta. A-143.

***Pandalus danae* Stimpson 1857**
Pandalus danae: Rathbun 1904, p. 47, fig. 13; de Man 1920, p. 103.

Description
One male, c.l. 9.5 mm; Sta. A-8.
One male, c.l. 9.7 mm; Sta. A-54.
Four males, c.l. 9.4–11.4 mm, 2 transitionals, c.l. 12.9 and 14.8 mm, 3 juveniles, c.l. 4.8–5.0 mm; Sta. A-86.
Four males, c.l. 8.8–11.6 mm, one juvenile, c.l. ca. 3.2 mm; Sta. A-87.
Six males, c.l. 9.0–12.0 mm, 2 transitionals, c.l. 12.9 and 13.0 mm, one female, c.l. 12.2 mm; Sta. A-92.
One male, c.l. 9.3 mm, 4 juveniles, c.l. 2.7–5.6 mm; Sta. A-131.
Three juveniles, c.l. 2.1–2.5 mm; Sta. A-151.
One female, c.l. 14.4 mm, 4 juveniles, c.l. 4.0–6.1 mm; Sta. A-174.
One female, c.l. 15.3 mm; Sta. A-175.

Remarks
Not included above are two very damaged, tentatively identified specimens (not sexed) from a fish stomach, Sta. A-32, and two larvae (also tentatively identified) from Sta. A-45.

Although the juvenile, c.l. 6.1 mm, from Sta. A-174 possesses a small *appendix masculina* about half the length of the *appendix interna,* none of the other juveniles show any trace of the *appendix.* The juvenile, c.l. 2.1 mm, from Sta. A-151 has a rudimentary *appendix interna* on the second pleopods.

***Pandalus goniurus* Stimpson 1860**
Pandalus goniurus: Rathbun 1904, p. 38, pl. 1, fig. 3; de Man 1920, p. 103.

Description
One male, c.l. 11.5 mm; Sta. A-52.
Three males, c.l. 11.2–12.8 mm, 2 transitionals, c.l. 15.8 and 15.9 mm, 5 females, c.l. 15.0–19.0 mm; Sta. A-119.

***Pandalus hypsinotus* Brandt 1851**
Pandalus hypsinotus: Rathbun 1904, p. 46, pl. 2, fig. 5; de Man 1920, p. 103.

Description
One male, c.l. ca. 14.0 mm; Sta. A-40.
Three juveniles, c.l. 4.4–5.4 mm; Sta. A-54.
One juvenile, c.l. ca. 2.7 mm; Sta. A-56.
One female, c.l. 21.9 mm; Sta. A-76.
Five males, c.l. 17.1–19.7 mm, 2 transitionals, c.l. 28.5 mm (both), 6 females, c.l. 21.7–29.8 mm; Sta. A-84.
Nineteen juveniles, c.l. 4.0–5.7 mm; Sta. A-86.
Twenty-five juveniles, c.l. 2.8–5.4 mm; Sta. A-87.
Three juveniles, c.l. 3.6–3.8 mm; Sta. A-91.
Eight males, c.l. 12.8–16.2 mm; Sta. A-100.
One male, c.l. 16.9 mm; Sta. A-104.
Six males, c.l. 12.6–22.9 mm, 4 transitionals, c.l. 24.3–28.0 mm, one female, c.l. 26.7 mm; Sta. A-119.
Twenty-five juveniles, c.l. 3.2–6.0 mm; Sta. A-131.
Seventeen juveniles, c.l. 3.7–5.4 mm; Sta. A-136.
One juvenile, c.l. 4.2 mm; Sta. A-139.
Two males, c.l. 14.4 and 19.1 mm, 3 females, c.l. 18.8–27.5 mm; Sta. A-144.
One male, c.l. 18.2 mm; Sta. A-149.
Eight juveniles, c.l. ca. 4.5–ca. 5.5 mm; Sta. A-151.
One transitional, c.l. 30.0 mm; Sta. A-167.
Two juveniles, c.l. 4.3 and 5.7 mm; Sta. A-174.

Remarks
Seven of the juveniles, c.l. respectively 5.2, 5.5 and 5.5 mm (Sta. A-86), 5.1 and 5.4 mm (Sta. A-131), 5.4 mm (Sta. A-136), and 5.7 mm (Sta. A-174), bear a very small, bud-like *appendix masculina.* All the other juveniles show no trace of the *appendix.*

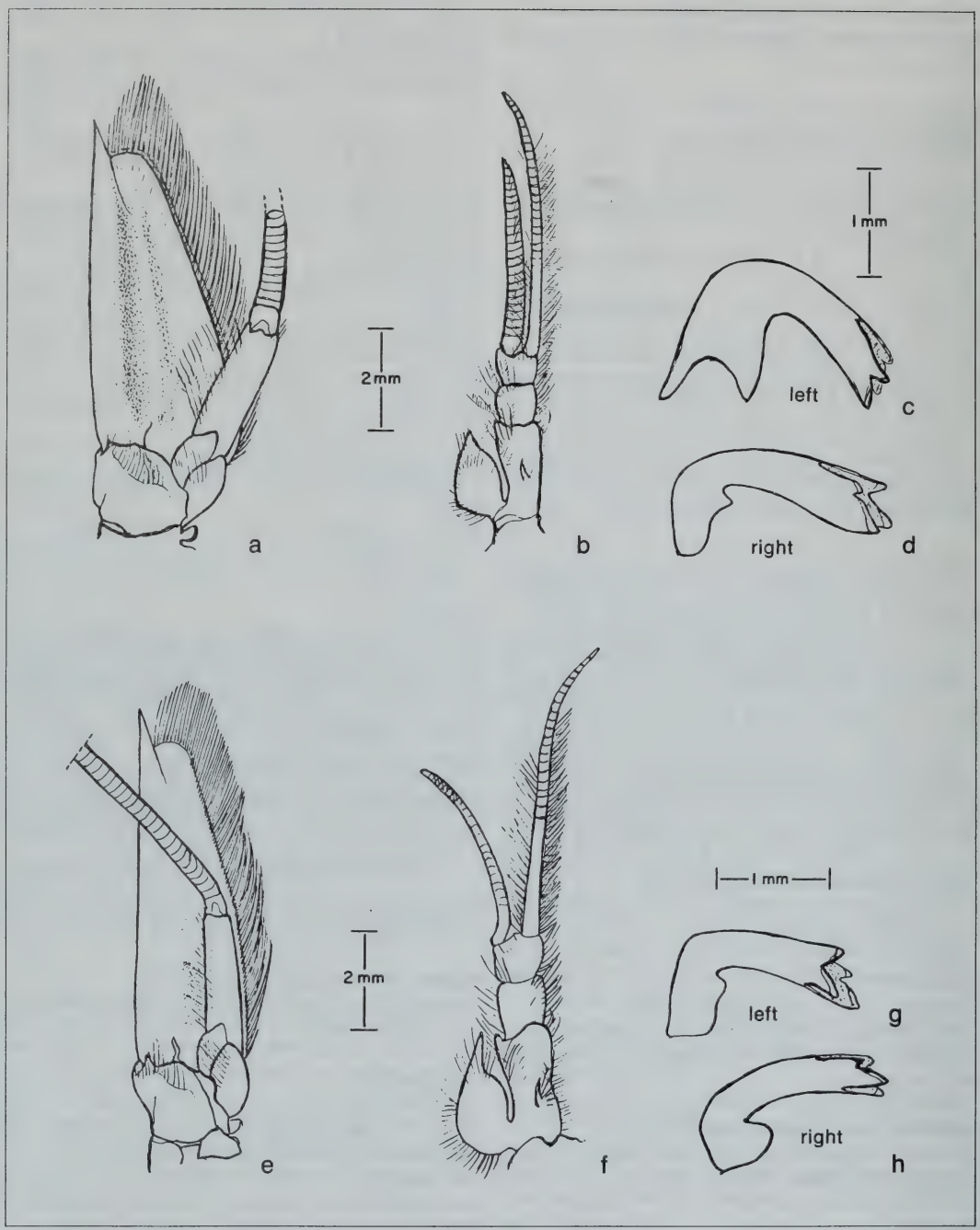
***Pandalus montagui tridens* Rathbun 1902**
Pandalus montagui tridens: Rathbun 1904, p. 41, pl. 2, fig. 2; de Man 1920, p. 104.

Description
One juvenile, c.l. 3.0 mm; Sta. A-153.

***Pandalus platyceros* Brandt 1851**
Pandalus platyceros: Rathbun 1904, p. 44; de Man 1920, p. 104.

Description
Ten juveniles, c.l. 3.0–4.8 mm; Sta. A-3.
Ten juveniles, c.l. 10.5–10.8 mm; Sta. A-33.
Two juveniles, c.l. 3.5 and 4.8 mm; Sta. A-71.
One juvenile, c.l. 3.0 mm; Sta. A-75.
Two juveniles, c.l. 2.6 and 7.0 mm; Sta. A-139.
Seven males, c.l. 16.3–26.7 mm; Sta. A-144.
One juvenile, c.l. 4.8 mm; Sta. A-151.

Remarks
Apart from these specimens, the collection also contains 20 larvae and post-larvae (most



Figure

a Antennal scale of *Crangon septemspinosa* from White Bear Bay, Newfoundland

b Antennule of *Crangon septemspinosa* from White Bear Bay, Newfoundland

c, d Mandibles of *Crangon septemspinosa* from White Bear Bay, Newfoundland

e Antennal scale of *Crangon alaskensis* from southeastern Alaska and Prince William Sound

f Antennule of *Crangon alaskensis* from southeastern Alaska and Prince William Sound

g, h Mandibles of *Crangon alaskensis* from southeastern Alaska and Prince William Sound

of them tentatively identified) from Sta. A-3 and A-32, two carapaces (ca. 17.0 and ca. 18.5 mm) from a fish stomach, Sta. A-100, and some digested fragments, also from a fish stomach, Sta. A-142.

The males from Sta. A-144 (except the specimen c.l. 26.7 mm) bear very small to small *appendix masculina;* the juveniles show no trace of the *appendix.*

***Pandalus stenolepis* Rathbun 1902**

Pandalus stenolepis: Rathbun 1904, p. 49, fig. 14, pl. 2, fig. 4; de Man 1920, p. 104.

Description

One male, c.l. 6.0 mm, 2 females, c.l. 9.0 mm (both); Sta. A-45.

Family Crangonidae

***Crangon (Crangon) alaskensis* Lockington 1877**

(See Plate 1, figs. e–h, p. 16; Figure 1, p. 18)

Crangon (Crangon) alaskensis: Zarenkov 1965, p. 1762.

Crangon alaskensis: Rathbun 1904, p. 114, figs. 52, 53; de Man 1920, p. 249.

Description

Twelve males, c.l. 3.0–7.5 mm, 58 females, c.l. 3.0–12.0 mm, 100 larvae and post-larvae, c.l. 1.0–2.5 mm; Sta. A-12, A-13, A-18, A-30, A-34, A-37, A-43, A-67, A-73, A-79, A-81, A-86, A-87, A-93, A-96, A-109, A-113, and A-146.

Remarks

Although some of the specimens were first identified as *Crangon septemspinosa,* it was later concluded that they were all *C. alaskensis.* The faint dorsal carination of the fifth abdominal segment of *C. alaskensis* is not always clear; the stylocerite, however, seems to be more pointed distally and the antennal scale is relatively narrower in *C. alaskensis* than in *C. septemspinosa* (see Plate 1, figs. a, b, e, and f, p. 16). The inner cusps of the mandibles of *C. alaskensis* seem to be the same height as those of the mandibles of *C. septemspinosa* (see Plate 1, figs. c, d, g, and h, p. 16). It is curious, however, that in specimens of *C. septemspinosa* from Chesapeake Bay the width-length ratio of the antennal scale is closer to *C. alaskensis* than to specimens of *C. septemspinosa* from Newfoundland (see Plate 1, figs. c, d, and g, h, p. 16).

One of the authors, H. J. Squires, had the opportunity of examining eight specimens of *Crangon* from Alaska deposited at the Smithsonian Institution, Washington, and referred by M. J. Rathbun (1904) to *C. septemspinosa.* Three of the specimens appeared to be *C. alaskensis.*

The ovaries of 22 ovigerous and 28 non-ovigerous females were examined. One of the former and five of the latter had large ova, and the remaining females had small ova.

The diameter of the eyed eggs was 0.4–0.6 mm (usually 0.6 mm), and that of the non-eyed eggs was 0.4–0.5 mm (usually 0.4 mm).

***Crangon (Crangon) stylirostris* Holmes 1900**

Crangon (Crangon) stylirostris: Zarenkov 1965, p. 1762.

Crangon stylirostris: Rathbun 1904, p. 118, fig. 59; de Man 1920, p. 250.

Description

Two ovigerous females (one with eyed eggs), c.l. 8.0 mm (both); Sta. A-40.

Remarks

The diameter of the eggs was 0.6 mm.

***Crangon (Neocrangon) communis* Rathbun 1899**

Crangon (Neocrangon) communis: Zarenkov 1965, p. 1762.

Crangon communis: Rathbun 1904, p. 123, fig. 64; de Man 1920, p. 250.

Description

Three females (largest one with eyed eggs), c.l. 6.0–12.0 mm; Sta. A-40.

Two ovigerous females (smaller one with eyed eggs), c.l. 10.0 and 10.3 mm; Sta. A-76.

Four females (largest one with eyed eggs), c.l. 7.7–12.0 mm; Sta. A-119.

Three females (two largest ones ovigerous, one of them with eyed eggs), c.l. 12.0–14.3 mm; Sta. A-143.

Remarks

Both females from Sta. A-76, as well as the non-ovigerous female from Sta. A-143, possess an abnormal, long, ascending rostrum exceeding the eyes. According to Rathbun (1904: 124), such a rostrum is not uncommon in *C. communis.*

The ovaries of the females from Sta. A-40 were examined. The ovigerous female had

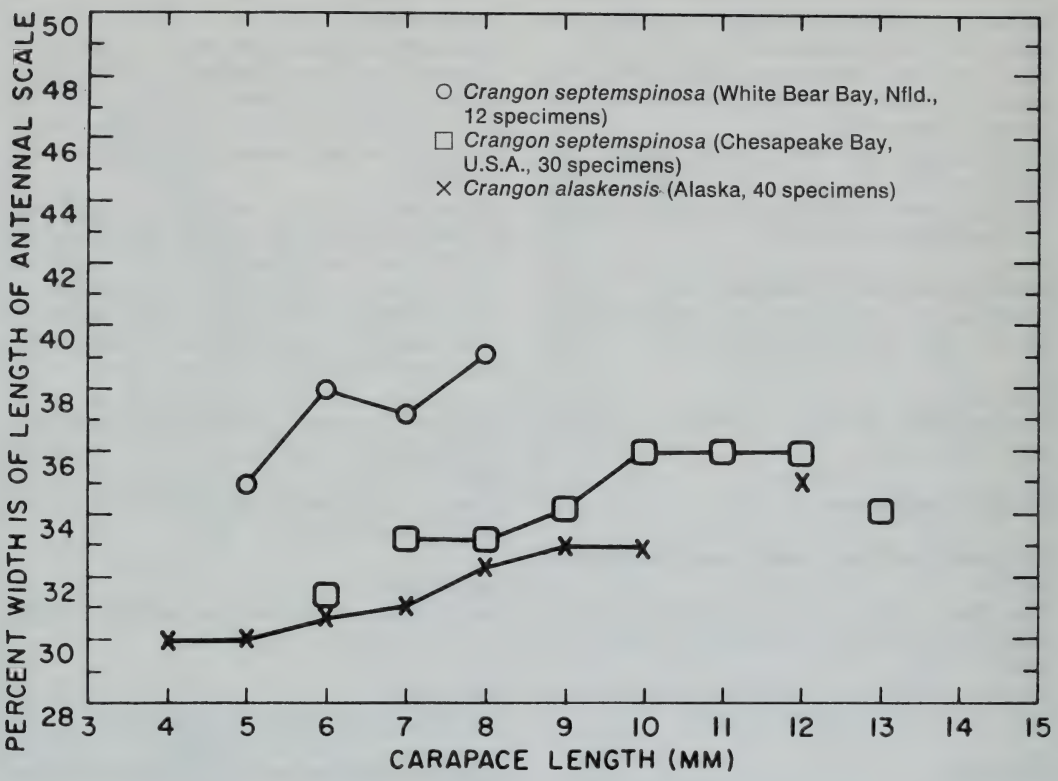


Figure 1
Comparative widths of antennal scales in *Crangon septemspinosa* from White Bear Bay, Newfoundland and from Chesapeake Bay, U.S.A., and in *C. alaskensis* from Alaska.

small ova and the two non-ovigerous females were immature.

The diameter of the eggs was 1.0 mm.

***Crangon (Neocrangon) dalli* Rathbun 1902**

Crangon (Neocrangon) dalli: Zarenkov 1965, p. 1762, fig. 1.

Crangon dalli: Rathbun 1904, p. 119, fig. 60; de Man 1920, p. 250.

Description

One male, c.l. 7.0 mm; Sta. A-84.
One female, c.l. 14.7 mm; Sta. A-119.
One female, c.l. 10.0 mm; Sta. A-149.

***Crangon (Neocrangon) franciscorum* Stimpson 1856**

Crangon (Neocrangon) franciscorum: Zarenkov 1965, p. 1762.

Crangon franciscorum: Rathbun 1904, p. 120, fig. 61; de Man 1920, p. 250.

Description

Sixty-five specimens (of which only one was an ovigerous female); Sta. A-11, A-12, A-34, A-37, A-43, A-60, A-73, A-84, A-136, A-151, and A-153.

Remarks

One of the specimens (from Sta. A-73) had an abnormal frontal margin of the carapace without trace of a rostrum, and an abnormally small antennal scale. The chelae of the first pereiopods of some of the specimens

seemed quite similar to those of Rathbun's variety *angustimana*.

The single ovigerous female was obtained at Sta. A-11.

***Crangon (Neocrangon) nigricauda* Stimpson 1856**

Crangon (Neocrangon) nigricauda: Zarenkov 1965, p. 1762.

Crangon nigricauda: Rathbun 1904, p. 112, fig. 50; de Man 1920, p. 250.

Description

One female, c.l. 8.0 mm; Sta. A-16.
One female, c.l. ca. 6.1 mm; Sta. A-18.
One juvenile, c.l. 3.0 mm; Sta. A-153.

Remarks

The female from Sta. A-16 contained large ova.

***Sclerocrangon boreas* (Phipps 1774)**

Sclerocrangon boreas: Rathbun 1904, p. 133; de Man 1920, p. 251; Zarenkov 1965, p. 1766.

Description

Three males, c.l. 4.3–18.6 mm, 6 females, c.l. 5.0–25.7 mm; Sta. A-75, A-83, A-86, A-114, and A-117.

Remarks

A female from Sta. A-114 (incidentally, the only ovigerous female of *S. boreas* in the present collection) bore an accessory spine on the median dorsal spine of the carapace.

***Argis dentata* (Rathbun 1902)**

Argis dentata: de Man 1920, p. 256.

Nectocrangon dentata: Rathbun 1904, p. 138, figs. 76, 77; Zarenkov 1965, p. 1764.

Description

Seven males, c.l. 11.0–19.8 mm, 12 females, c.l. 7.0–21.2 mm; Sta. A-40, A-76, A-84, A-114, A-119, A-143, A-144, and A-149.

***Argis levior* (Rathbun 1902)**

Argis levior: de Man 1920, p. 256.

Nectocrangon levior: Rathbun 1904, p. 143, figs. 86, 87; Zarenkov 1965, p. 1764.

Description

Four females, c.l. 9.0–11.0 mm; Sta. A-21.

Remarks

One of the specimens (c.l. 9.0 mm) contained small ova, and the remaining specimens contained large ova.

***Paracrangon echinata* Dana 1852**

Paracrangon echinata: Rathbun 1904, p. 143; de Man 1920, p. 257.

Description

One female, c.l. 13.0 mm; Sta. A-165.
One female, c.l. 13.5 mm; Sta. A-169.

Remarks

Both specimens contained large ova.

Suborder Reptantia

Family Callianassidae

***Upogebia pugettensis* (Dana 1852)**

Upogebia pugettensis: Rathbun 1904, p. 153; de Man 1928, p. 23, p. 40.

Description

Three males, c.l. 14.1–21.5 mm; Sta. A-27. Poor condition.
Seven males, c.l. 7.0–ca. 23.0 mm, 4 females (of which one had eyed eggs), c.l. ca. 16.0–ca. 24.0 mm; Sta. A-97. Poor condition.

Remarks

The ovigerous female and one of the non-ovigerous females contained large ova, and the remaining non-ovigerous females contained small ova.

Conclusion

Three of the species obtained by the expedition *(Eualus gaimardii, Spirontocaris phippsii,* and *Pandalus stenolepis)* were extracted from fish stomachs. From the field data available to the authors, the vertical distribution of the remaining 37 species can be summarized as follows:

a) Species found exclusively in the intertidal zone: *Eualus pusiolus, Heptacarpus camtschaticus, H. carinatus, H. paludicola, H. pictus, H. sitchensis, H. stimpsoni, H. stylus, Heptacarpus* sp., *Spirontocaris ochotensis, Hippolyte clarki, Pandalus danae, P. montagui tridens, Crangon nigricauda, C. stylirostris,* and *Upogebia pugettensis;*

b) Species obtained mostly in the intertidal zone, with only a few specimens from deeper stations (11–35 fathoms): *Heptacarpus brevirostris, Crangon alaskensis,* and *C. franciscorum;*

c) Species obtained partly in the intertidal zone, partly in very shallow water (3–5 fathoms): *Sclerocrangon boreas;*

d) Species obtained mostly from deep stations (25–66 fathoms) with only a few specimens from just below the low-water mark: *Argis dentata;*

e) Species obtained as post-larvae or juveniles in the intertidal zone, as adults only from deeper stations (14–52 fathoms): *Lebbeus groenlandicus, Pandalus hypsinotus,* and *P. platyceros;*

f) Species obtained partly intertidally, partly in deeper water (15–52 fathoms): *Heptacarpus tridens;*

g) Species obtained exclusively at the deeper stations (20–66 fathoms): *Eualus avinus, E. fabricii,* (?) *E. suckleyi, E. townsendi, Heptacarpus decorus, Pandalopsis dispar, Pandalus borealis, P. goniurus, Crangon communis, C. dalli, Argis levior,* and *Paracrangon echinata.*

As it was pointed out in the section entitled Systematic Treatment, many of the ovigerous females of *Heptacarpus brevirostris, H. pictus* and *H. sitchensis,* a few of the ovigerous females of *Hippolyte clarki,* and one of the ovigerous females of both *Crangon alaskensis* and *Upogebia pugettensis* contained large ova in the ovaries. This seems to indicate that at least the first three species mentioned normally extrude more than one batch of eggs during the summer. This appears to be typical of littoral species of decapods from other north-temperate areas (Squires 1965).

One conspicuous feature is the complete absence of ovigerous females among the pandalids collected. Too few specimens of the latter were obtained, so that any sound conclusions about their biology are impossible. The number of males, females and transitionals of *Pandalopsis dispar, Pandalus borealis, P. danae,* and *P. hypsinotus,* the range of their carapace length, and the absence of ovigerous females at the time they were collected (first week of June to the last week of July) suggest, however, that the biology of the populations of these four species in the area where they were collected is similar to that of the populations living in the Strait of Georgia, as described by Butler (1964).

Appendix

List of Species per Station

Sta. A-3	*Heptacarpus brevirostris, H. carinatus, H. sitchensis, H. stylus, Hippolyte clarki, Pandalus platyceros*
Sta. A-7	*Heptacarpus sitchensis*
Sta. A-8	*Hippolyte clarki, Pandalus danae*
Sta. A-11	*Crangon franciscorum*
Sta. A-12	*Crangon alaskensis, C. franciscorum*
Sta. A-13	*Heptacarpus brevirostris, Pandalopsis dispar, Pandalus borealis, Crangon alaskensis*
Sta. A-16	*Crangon nigricauda*
Sta. A-18	*Heptacarpus brevirostris, H. paludicola, H. sitchensis, Crangon alaskensis, C. nigricauda*
Sta. A-19	*Heptacarpus sitchensis, H. stylus*
Sta. A-21	*Argis levior*
Sta. A-22	*Heptacarpus brevirostris, H. carinatus, H. sitchensis*
Sta. A-23	*Heptacarpus brevirostris, H. sitchensis, Heptacarpus* sp.
Sta. A-27	*Heptacarpus sitchensis, Heptacarpus* sp., *Upogebia pugettensis*
Sta. A-30	*Crangon alaskensis*
Sta. A-32	*Heptacarpus brevirostris, H. camtschaticus, Lebbeus groenlandicus, Hippolyte clarki, Pandalus platyceros*
Sta. A-33	*Pandalus platyceros*
Sta. A-34	*Crangon alaskensis, C. franciscorum*
Sta. A-37	*Heptacarpus brevirostris, Crangon alaskensis, C. franciscorum*
Sta. A-40	*Pandalus hypsinotus, Crangon communis, Argis dentata*
Sta. A-43	*Crangon alaskensis, C. franciscorum*
Sta. A-45	*Eualus gaimardii, Eualus pusiolus, Spirontocaris phippsii, Pandalus stenolepis*
Sta. A-48	*Heptacarpus brevirostris*
Sta. A-52	*Pandalus goniurus*
Sta. A-54	*Heptacarpus brevirostris, Pandalus danae, P. hypsinotus*
Sta. A-56	*Pandalus hypsinotus*
Sta. A-57	*Heptacarpus brevirostris, H. carinatus*
Sta. A-60	*Crangon franciscorum*
Sta. A-67	*Heptacarpus brevirostris, H. sitchensis, Crangon alaskensis*
Sta. A-71	*Heptacarpus brevirostris, Pandalus platyceros*
Sta. A-72	*Pandalus borealis*
Sta. A-73	*Crangon alaskensis, C. franciscorum*
Sta. A-75	*Heptacarpus brevirostris, Pandalus platyceros, Sclerocrangon boreas*
Sta. A-76	*Pandalus borealis, P. hypsinotus, Crangon communis, Argis dentata*
Sta. A-79	*Heptacarpus sitchensis, Crangon alaskensis*
Sta. A-80	*Heptacarpus brevirostris*
Sta. A-81	*Eualus pusiolus, Heptacarpus brevirostris, Crangon alaskensis*
Sta. A-83	*Heptacarpus brevirostris, Sclerocrangon boreas*
Sta. A-84	(?) *Eualus suckleyi, Heptacarpus brevirostris, Pandalus borealis, Crangon dalli, C. franciscorum, Argis dentata*
Sta. A-86	*Heptacarpus camtschaticus, H. pictus, H. sitchensis, H. stimpsoni, Spirontocaris ochotensis, Pandalus danae, P. hypsinotus, Crangon alaskensis, Sclerocrangon boreas*
Sta. A-87	*Heptacarpus brevirostris, H. camtschaticus, H. sitchensis, Spirontocaris ochotensis, Hippolyte clarki, Pandalus danae, P. hypsinotus, Crangon alaskensis*
Sta. A-88	*Heptacarpus sitchensis*

Sta. A-91	*Heptacarpus brevirostris, H. sitchensis, Pandalus hypsinotus*
Sta. A-92	*Heptacarpus brevirostris, H. camtschaticus, H. sitchensis, Spirontocaris ochotensis, Pandalus danae*
Sta. A-93	*Heptacarpus brevirostris, Crangon alaskensis*
Sta. A-96	*Heptacarpus sitchensis, Crangon alaskensis*
Sta. A-97	*Upogebia pugettensis*
Sta. A-98	*Heptacarpus sitchensis*
Sta. A-99	*Heptacarpus sitchensis*
Sta. A-100	*Eualus fabricii, Heptacarpus camtschaticus, Pandalus hypsinotus, P. platyceros*
Sta. A-104	*Pandalus hypsinotus*
Sta. A-109	*Crangon alaskensis*
Sta. A-113	*Crangon alaskensis*
Sta. A-114	*Heptacarpus sitchensis, Sclerocrangon boreas, Argis dentata*
Sta. A-115	*Heptacarpus brevirostris, H. sitchensis*
Sta. A-116	*Spirontocaris phippsii*
Sta. A-117	*Sclerocrangon boreas*
Sta. A-119	*Eualus fabricii,* (?) *E. suckleyi, Lebbeus groenlandicus, Pandalus borealis, P. goniurus, P. hypsinotus, Crangon communis, C. dalli, Argis dentata*
Sta. A-129	*Heptacarpus brevirostris*
Sta. A-131	*Heptacarpus brevirostris, H. sitchensis, Pandalus danae, P. hypsinotus*
Sta. A-136	*Heptacarpus brevirostris, H. sitchensis, Pandalus hypsinotus, Crangon franciscorum*
Sta. A-139	*Heptacarpus brevirostris, H. sitchensis, Pandalus hypsinotus, P. platyceros*
Sta. A-140	*Crangon stylirostris*
Sta. A-142	*Pandalus platyceros*
Sta. A-143	*Eualus avinus,* (?) *E. suckleyi, Pandalopsis dispar, Pandalus borealis, Crangon communis, Argis dentata*
Sta. A-144	*Eualus townsendi, Heptacarpus decorus, H. tridens, Lebbeus groenlandicus, Pandalus hypsinotus, F. platyceros, Argis dentata*
Sta. A-146	*Heptacarpus sitchensis, Crangon alaskensis*
Sta. A-147	*Heptacarpus brevirostris*
Sta. A-149	*Pandalus hypsinotus, Crangon dalli, Argis dentata*
Sta. A-151	*Heptacarpus brevirostris, Spirontocaris ochotensis, Pandalus danae, P. hypsinotus, P. platyceros, Crangon franciscorum*
Sta. A-153	*Heptacarpus brevirostris, Pandalus montagui tridens, Crangon franciscorum, C. nigricauda*
Sta. A-164	*Heptacarpus brevirostris, H. stylus*
Sta. A-165	*Paracrangon echinata*
Sta. A-167	*Pandalus hypsinotus*
Sta. A-168	*Heptacarpus brevirostris, H. sitchensis, H. stylus*
Sta. A-169	*Paracrangon echinata*
Sta. A-173	*Heptacarpus tridens*
Sta. A-174	*Heptacarpus brevirostris, H. camtschaticus, H. sitchensis, H. tridens, Hippolyte clarki, Pandalus danae, P. hypsinotus*
Sta. A-175	*Heptacarpus brevirostris, H. carinatus, Hippolyte clarki, Pandalus danae*

References Cited

Bousfield, E. L., and D. E. McAllister
(1962). Station list of the National Museum Marine Biological Expedition to Southeastern Alaska and Prince William Sound. Nat. Mus. Can. Bull. 183: 76–103.

Butler, T. H.
(1964). Growth, reproduction, and distribution of pandalid shrimps in British Columbia. J. Fish. Res. Board Can. 21(6): 1403–52.

Chace, F. A.
(1951). The grass shrimps of the genus *Hippolyte* from the west coast of North America. J. Wash. Acad. Sci. 41: 35–39.

Hart, J. F. L.
(1968). Crab-like Anomura and Brachyura (Crustacea: Decapoda) from southeastern Alaska and Prince William Sound. Nat. Mus. Can. Natur. Hist. Pap. 38: 1–6.

Holmes, S. J.
(1900). Synopsis of California stalk-eyed Crustacea. Occas. Pap. Calif. Acad. Sci. 7: 1–262, pls. 1–4.

Holthuis, L. B.
(1947). The Decapoda of the Siboga expedition. Part IX: The Hippolytidae and Rhynchocinetidae collected by the Siboga and Snellius expeditions with remarks on other species. Siboga Exped., Livr. 140 (monogr. XXXIX a^8): I–IV + 1–100.

Man, J. G. de
(1920). The Decapoda of the Siboga expedition. Part IV: Families Pasiphaeidae, Stylodactylidae, Hoplophoridae, Nematocarcinidae, Thalassocaridae, Pandalidae, Psalidopodidae, Gnathophyllidae, Processidae, Glyphocrangonidae and Crangonidae. Siboga Exped., Livr. 87 (monogr. XXXIX a^3): I–VI + 1–318, pls. 1–25.
(1928). The Decapoda of the Siboga expedition. Part VII: The Thalassinidae and Callianassidae collected by the Siboga expedition with remarks on the Laomediidae. Siboga Exped., Livr. 109 (monogr. XXXIX a^6): I–VI + 1–187, pls. 1–20.

Rathbun, M. J.
(1904). Decapod crustaceans from the northwest coast of North America. Harriman Alaska Exped. 10: 1–210, pls. 1–10.

Schmitt, W. L.
(1921). The marine decapod Crustacea of California with special reference to the decapod Crustacea collected by the United States Bureau of Fisheries steamer "Albatross" in connection with the biological survey of San Francisco Bay during the years 1912–1913. Univ. Calif. Publ. Zool. 23: 1–470, pls. 1–50.

Squires, H. J.
(1965). Decapod crustaceans of Newfoundland, Labrador and Canadian eastern Arctic. Fish. Res. Board Can. Manuscr. Rep. Ser. (Biol.) 810: 1–212.

Zarenkov, N. A.
(1965). Revision of the genera *Crangon* Fabricius and *Sclerocrangon* G.O. Sars (Decapoda, Crustacea). Zool. Zh. 44(12): 1761–74 [in Russian, summary in English].

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